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(54) Electret

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(57) Claims

1. An electret made of a copolymer comprised of 4-methyl-1-pentene and C6 - C18 α-olefin.

2. The electret of claim 1 wherein the content of the said α-olefin is 0.3 - 20 mol%.

Detailed Explanation of the Invention

This invention pertains to electret comprised of a specific 4-methyl-1-pentene copolymer.

Electrets are applied for acoustic elements such as microphones, speakers, and cartridges, and application is extended to measuring elements, noncontact switches, air filters, and memory elements. Recently, polymer electrets are used in the medical field.

Conventionally, polymers such as polyethylenes and polypropylenes are used for this purpose. However, the polarization damping effect progresses quickly in these materials.

The inventor of this invention discovered that a high performance electret can be obtained from a specific type of 4-methyl-1-pentene polymer and accomplished this invention. This invention is an electret made of a copolymer comprised of 4-methyl-1-pentene and C6 - C18 α-olefin.

For the said α-olefin, components such as 1-hexene, 3-methyl-1-pentene, 1-octene, 1-decene, 1-tetradecene, and 1-octa decene can be mentioned. A combination of these may also be used. The amount of the said α-olefin in the copolymer is 0.3 - 20 mol%, preferably 1 - 12 mol%. When less than 0.3 mol%, the formability suffers, and when more than 20 mol%, the electret performance deteriorates.

Monomers selected from unsaturated carboxylates and derivatives may be added to 4-methyl-1-pentene copolymer as necessary.

The said copolymer may contain components such as polyamides, polyesters, polycarbonates, ionomers, polyvinyl chlorides, polystyrenes, ABS resins, acrylic resins, vinyl chlorides, petro resins, rosin, natural rubber, and fluorine resins. Other additives such as processed oils, plasticizers, fillers, dyes, pigments, anti-oxidants, and stabilizers may also be contained.

Examples of these components are: magnesium oxide, magnesium hydroxide, talc, barium sulfate, gypsum, calcium carbonate, magnesium carbonate, clay, silica, titanium, mica, glass powder, glass fiber, etc.

In this case, known electret processes may be used.

The electret of this invention may be formed into fibers, films, tubes, and porous films and can be suitably used for acoustic elements, filters, and memory elements.

The invention is further explained with examples.

Comparative Example 1

A 50 μ thick T-die film was formed from high density polyethylene (HDPE) with a melt flow index (MI) of 0.9, and density of 0.954 g/cm^2.

The film was placed between electrodes, and DC -10 KV was applied, heated for 2 minutes at 120°C, cooled to room temperature, and charge was discontinued.

The surface potential of the electret was -1800 V. When the surface potential was checked again after being stored at 20°C and 60 - 70 %RH for 7 days, the value was near 0.

The surface potential was checked by a rotating center type surface voltmeter.

Comparative Example 2

A 50 μ thick T-die film was formed from isotactic polypropylene (PP) with MI of 7, and density of 0.91 g/cm^3.

The film was processed as above, and the surface potential was checked. The results are shown in table 1.

Practical Example 1

A 50 μ thick T-die film was formed from 4-methyl-1-pentene copolymer containing 2.5 mol% 1-decene (4-M-1-P copolymer) and processed as above, and the surface potential was checked. The results are shown in table 1.

Table 1

(1) Copolymers

p. ex 1. 1-pentene

p. ex 3. 1-hexene

p. ex 5. 1-octene

p. ex 7. 1-decene

(2) Content (mol%)

(3) Surface potential

a. Right after application

b. After 7 days

	(1) 共重合モノマー	(2) 含有量 (モル%)	(3) 表面電位 (V) 印加直後	7日後
比較例1	(HDPE)	—	−1800	0
〃 2	(PP)	—	−4150	−1350
実施例1	1−ペンテン	5	−4300	−2500
〃 2	〃	10	−4600	−2800
〃 3	1−ヘキセン	3	−4500	−2500
〃 4	〃	7	−4100	−3600
〃 5	1−オクテン	4	−4700	−2500
〃 6	〃	12	−4900	−3300
〃 7	1−デセン	3	−4400	−3200
〃 8	〃	5	−4500	−3000

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